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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/927,068 | 08/09/2001 | Jianhui Chen | TWI-13600 | 4935 |

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| STOCK JR, GORDON J | |
| ART UNIT | PAPER NUMBER |
| 2877 | |

DATE MAILED: 01/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/927,068 | CHEN ET AL. | |
| | Examiner | Art Unit | |
| | Gordon J Stock | 2877 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *06 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-51* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-51* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *20031106*.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

## DETAILED ACTION

### *Response to Amendment*

1. The amendment received on November 6, 2003 has been entered into the file.

2. The declaration filed on November 6, 2003 under 37 CFR 1.131 has been considered but is ineffective to overcome the **Mikkelsen et al. (6,600,560)** reference because of the following:

It has not been adequately demonstrated that Mr. Ward Dixon is an "other party in interest" as stated in MPEP 715.04: party D, or if under MPEP 715.04: party C, it has not been adequately demonstrated that Mr. Ward Dixon is a proprietary interest (37 CFR 1.47). And as stated under MPEP 715.04: party C, there has not been demonstrated diligent effort in reaching the inventors (37 CFR 1.47).

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 1-4, 8, 15-18, 21, 28-31, 35, 41-51** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Mikkelsen et al. (6,600,560)** in view of **Kokubo et al. (5,686,993)**.

As to **claim 1**, Mikkelsen in an optical measurement arrangement discloses: a first light source emitting radiation over a first broadband emission spectrum, a halogen lamp comprising xenon and a second light source being substantially transparent over a portion of the first broadband emission spectrum, the infrared portion, a deuterium lamp (col. 6, lines 5-15); a first optical system for directing a portion of the radiation emitted from the first light source through

the second light source; a second optical system that produces a second image of the second light source (Fig. 1); an aperture stop (Fig. 1; 5); a third optical system for focusing the radiation transmitted by the aperture stop on the sample (Fig. 1). As for the focusing and the focal positions, Mikkelsen is silent; however, he discloses the sources sharply imaged in the plane of the aperture stop (col. 6, lines 25-30). Kokubo in a film thickness measuring device teaches the sample is in a focal plane of the objective lens in order to irradiate the sample (col. 1, lines 10-30) and that the first light source is focused on the second light source (col. 4, lines 60-67) and which are conjugate with each other (col. 5, lines 1-10) and discloses the conjugate nature of the light sources with the aperture stop and sample to have the field stop determine the illumination area of the sample (col. 5, lines 40-55). Therefore, it would be obvious to one skilled in the art that the first optical system forms a first image of the first light source at a first focal position substantially on the second light source and the second optical system produces a second image of the second light source at a second focal position along with the image of the first light source; whereas, the aperture, the light sources, and the sample are conjugate each other in order to irradiate the sample in a prescribed illumination area.

For **claim 2** Mikkelsen discloses the first and second light sources are selected from the group consisting of incandescent and discharge sources, a halogen lamp and deuterium lamp (col. 6, lines 5-15).

For **claims 3-4** the lamps have emission spectra covering uv-vis and visible, deuterium and halogen lamps (col. 6, lines 5-15).

For **claims 8 and 15** the first light source is a xenon filled halogen lamp and the second light source is a deuterium lamp (col. 6, lines 5-15).

For **claim 16** the first, second and third optical systems employ at least one element consisting of transmissive and polarizing optics (Fig. 1; col. 6, lines 5-67).

As for **claim 17** the first focal position and second source position are substantially coincident for both are sharply imaged on the plane of the aperture stop and in view of Kokubo (see claim 1 above).

For **claim 18** Mikkelsen in view of Kokubo does mention the image of the aperture at the sample (see claim 1 above), and the sources are imaged sharply on the plane of the aperture that comprises the measurement beam (col. 6, lines 25-30; lines 45-60).

For **claim 21** Mikkelsen discloses the system is an ellipsometer (col. 8, lines 58-60).

For **claim 28** Mikkelsen in an optical measurement arrangement discloses: a first light source emitting radiation over a first broadband emission spectrum, a halogen lamp comprising xenon and a second light source being substantially transparent over a portion of the first broadband emission spectrum, the infrared portion, a deuterium lamp (col. 6, lines 5-15); a first optical system for directing a portion of the radiation emitted from the first light source through the second light source; a second optical system that produces a second image of the second light source (Fig. 1); an aperture stop (Fig. 1; 5); a third optical system for focusing the radiation transmitted by the aperture stop on the sample (Fig. 1); a detection system that also analyzes (col. 8, lines 20-25). Mikkelsen does not mention a processor but suggests a processor because there is a rapid readout of spectra (col. 8, lines 55-60). Examiner takes official notice that processors are well known in the art for evaluating data. Therefore, it would be obvious to one skilled in the art at the time the invention was made to have the system comprise a processor in order to evaluate the signals detected. In addition, Kokubo discloses a cpu for processing data (Fig. 1, **50-53**) As

for the focusing and the focal positions, Mikkelsen is silent; however, he discloses the sources sharply imaged in the plane of the aperture stop (col. 6, lines 25-30). Kokubo in a film thickness measuring device teaches the sample is in a focal plane of the objective lens in order to irradiate the sample (col. 1, lines 10-30) and that the first light source is focused on the second light source (col. 4, lines 60-67) and which are conjugate with each other (col. 5, lines 1-10) and discloses the conjugate nature of the light sources with the aperture stop and sample to have the field stop determine the illumination area of the sample (col. 5, lines 40-55). Therefore, it would be obvious to one skilled in the art that the first optical system forms a first image of the first light source at a first focal position substantially on the second light source and the second optical system produces a second image of the second light source at a second focal position along with the image of the first light source; whereas, the aperture, the light sources, and the sample are conjugate each other in order to irradiate the sample in a prescribed illumination area.

For **claim 45** Mikkelsen discloses the third optical system segregate polarization states (col. 3, lines 35-45; col. 6, lines 58-67; col. 7, lines 1-45). And in view of Kokubo there would be a polarized image on the sample (see claim 28 above) and Mikkelsen discloses the measurement beam being polarized (col. 6, lines 25-30; lines 45-60).

For **claim 46** Mikkelsen discloses a Rochon prism (col. 7, lines 58-65).

For **claim 47** Mikkelsen discloses the system is an ellipsometer (col. 8, lines 58-60).

For **claim 48** Mikkelsen is silent concerning polarized beam spectroscopic reflectometry or spectroscopic reflectometry. However, Mikkelsen teaches that optical material properties and surface structure may be calculated (col. 7, lines 30-40) and that ellipsometric and spectroscopic investigations may be performed (col. 8, lines 58-60). Therefore, it would be obvious to one

skilled in the art that the system can consist of a polarized beam spectroscopic reflectometer, for polarized beam spectroscopic reflectometry is a type of spectroscopic investigation that derives optical material properties and surface structure information.

As for **claims 49-51**, Mikkelsen's system comprises an ellipsometer that detects changes in polarization states at differing angles of incidence (col. 7, lines 25-40; col. 8, lines 58-61).

5. **Claims 5, 9, 11, 12, 32, 36, 37, 38** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Mikkelsen et al. (6,600,560)** in view of **Kokubo et al. (5,686,993)** and further in view of **Piwonka-Corle et al. (5,910,842)** and **Carlson et al. (4,771,629)**.

As for **claim 5 and 32** Mikkelsen is silent concerning the spectra of both sources being the same, but discloses a xenon filled halogen lamp and deuterium lamp (col. 6, lines 5-15). Carlson in a system for chemical analysis teaches that a xenon lamp and deuterium lamp have similar wavelength ranges (col. 11, lines 15-20). And Piwonka-Corle in an ellipsometry method teaches that the xenon arc lamp is preferable light source for flatter spectrum than a deuterium lamp that suggests similar spectral ranges (col. 6, lines 50-60). Therefore, it would be obvious to one skilled in the art that the sources have similar wavelengths for xenon lamps have similar spectral characteristics as a deuterium lamp.

As for **claims 9 and 36** Mikkelsen is silent concerning the first light source being a deuterium lamp and the second light source being from xenon. However, he discloses a xenon filled halogen lamp and deuterium lamp (col. 6, lines 5-15). Carlson in a system for chemical analysis teaches that a xenon lamp and deuterium lamp are functionally equivalent (col. 11, lines 15-20). And Piwonka-Corle in an ellipsometry method teaches that the xenon arc lamp is a preferable light for flatter spectrum than a deuterium lamp that suggests equivalence. Therefore,

it would be obvious to one skilled in the art at the time the invention was made to have the first and second light sources comprise a deuterium lamp and xenon lamp respectively, for they are recognized as functional equivalents of each other.

As for **claims 11 and 37** Mikkelsen is silent concerning the lamps being xenon arc lamps. Carlson in a system for chemical analysis teaches that a xenon lamp and deuterium lamp are functionally equivalent (col. 11, lines 15-20). And Piwonka-Corle in an ellipsometry method teaches that the xenon arc lamp is a preferable light for flatter spectrum than a deuterium lamp that suggests equivalence. Therefore, it would be obvious to one skilled in the art at the time the invention was made to have the first and second light sources comprise xenon arc lamps, for they are recognized as functional equivalents of deuterium lamps and xenon lamps.

As for **claims 12 and 38** Mikkelsen is silent concerning both sources being deuterium lamps. However, Carlson in a system for chemical analysis teaches that a xenon lamp and deuterium lamp are functionally equivalent (col. 11, lines 15-20). And Piwonka-Corle in an ellipsometry method teaches that the xenon arc lamp is a preferable light for flatter spectrum than a deuterium lamp that suggests equivalence. Therefore, it would be obvious to one skilled in the art at the time the invention was made to have the first and second light sources comprise deuterium lamps, for deuterium lamps are recognized as functional equivalents of xenon lamps.

6. **Claims 6, 10, 13, 19, 20, 22-27, 33, and 39** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Mikkelsen et al. (6,600,560)** in view of **Kokubo et al. (5,686,993)** and further in view of **Carlson et al. (4,771,629)**.

As for **claims 6 and 33**, Mikkelsen is silent concerning the differing spectra of the sources, but the two sources are a deuterium lamp and a halogen lamp that may be filled with

krypton or xenon (col. 6, lines 1-15). Carlson teaches that deuterium lamps differ from halogen bulbs (col. 11, lines 10-20). Therefore, it would be obvious to one skilled in the art at the time the invention was made that the two spectra of the light sources differ for the wavelength ranges of a halogen lamp versus a deuterium lamp differ.

As for **claims 10, 13, 39**, Mikkelsen is silent concerning a tungsten lamp for the first light source. However, Carlson teaches that halogen and tungsten bulbs are equivalent (col. 11, lines 10-20). Therefore, it would be obvious to one skilled in the art at the time to have the first light source be a tungsten lamp, for the tungsten lamp is an art-recognized equivalent to a halogen lamp.

For **claim 19** Mikkelsen discloses the third optical system segregate polarization states (col. 3, lines 35-45; col. 6, lines 58-67; col. 7, lines 1-45). And in view of Kokubo there would be a polarized image on the sample (see claim 1 above) and Mikkelsen discloses the measurement beam being polarized (col. 6, lines 25-30; lines 45-60).

For **claim 20** Mikkelsen discloses a Rochon prism (col. 7, lines 58-65).

For **claim 22** Mikkelsen discloses a method of using an apparatus: a first light source emitting radiation over a first broadband emission spectrum, a halogen lamp comprising xenon and a second light source being substantially transparent over a portion of the first broadband emission spectrum, the infrared portion, a deuterium lamp (col. 6, lines 5-15); a first optical system for directing a portion of the radiation emitted from the first light source through the second light source; a second optical system that produces a second image of the second light source (Fig. 1); an aperture stop (Fig. 1; 5); a third optical system for focusing the radiation transmitted by the aperture stop on the sample (Fig. 1). As for the focusing and the focal

positions, Mikkelsen is silent; however, he discloses the sources sharply imaged in the plane of the aperture stop (col. 6, lines 25-30). Kokubo in a film thickness measuring device teaches the sample is in a focal plane of the objective lens in order to irradiate the sample (col. 1, lines 10-30) and that the first light source is focused on the second light source (col. 4, lines 60-67) and which are conjugate with each other (col. 5, lines 1-10) and discloses the conjugate nature of the light sources with the aperture stop and sample to have the field stop determine the illumination area of the sample (col. 5, lines 40-55). Therefore, it would be obvious to one skilled in the art that the first optical system forms a first image of the first light source at a first focal position substantially on the second light source and the second optical system produces a second image of the second light source at a second focal position along with the image of the first light source; whereas, the aperture, the light sources, and the sample are conjugate each other in order to irradiate the sample in a prescribed illumination area.

Mikkelsen is silent concerning the differing spectra of the sources, but the two sources are a deuterium lamp and a halogen lamp that may be filled with krypton or xenon (col. 6, lines 1-15). Carlson teaches that deuterium lamps differ from halogen bulbs (col. 11, lines 10-20). Therefore, it would be obvious to one skilled in the art at the time the invention was made that the two spectra of the light sources differ for the wavelength ranges of a halogen lamp versus a deuterium lamp differ.

As for **claim 23** Mikkelsen discloses the first and second light sources are selected from the group consisting of incandescent and discharge sources, a halogen lamp and deuterium lamp (col. 6, lines 5-15). The lamps have emission spectra covering uv-vis and visible, for they are deuterium and halogen lamps (col. 6, lines 5-15).

As for **claim 24** the first, second and third optical systems of Mikkelsen employ at least one element consisting of transmissive and polarizing optics (Fig. 1; col. 6, lines 5-67).

As for **claim 25** Mikkelsen in view of Kokubo mentions forming an image of the aperture at the sample (see claim 22 above).

As for **claim 26** Mikkelsen is silent about a polarized image of the aperture at the sample. However, the sources are imaged sharply on the plane of the aperture that comprises the measurement beam that is polarized (col. 6, liens 25-30; lines 45-60). ). And in view of Kokubo there would be a polarized image on the sample (see claim 28 above) and Mikkelsen discloses the measurement beam being polarized (col. 6, lines 25-30; lines 45-60).

As for **claim 27** Mikkelsen discloses the system is an ellipsometer (col. 8, lines 58-60).

7. **Claims 7, 14, 34, and 40** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Mikkelsen et al. (6,600,560)** in view of **Kokubo et al. (5,686,993)** and further in view of **Carlson et al. (4,771,629)** and **Sei et al. (WO 01/06173).**

As for **claims 7, 14, 34, 40**, Mikkelsen is silent concerning the differing spectra of the sources, but the two sources are a deuterium lamp and a halogen lamp that may be filled with krypton or xenon (col. 6, lines 1-15). Carlson teaches that deuterium lamps differ from halogen bulbs (col. 11, lines 10-20). Therefore, it would be obvious to one skilled in the art at the time the invention was made that the two spectra of the light sources differ for the wavelength ranges of a halogen lamp versus a deuterium lamp differ. As for having the first light source comprise a tungsten-halogen lamp, Mikkelsen in view of Carlson is silent. However, Sei in a composite light source teaches the equivalence of a halogen lamp and a metal halide lamp (lines 10-12 of page 18 of translation). Therefore, it would be obvious to one skilled in the art at the time the

invention was made to substitute the halogen light source with a tungsten-halogen source, for the halogen lamp and metal-halide source are art recognized equivalents in composite light sources.

***Response to Arguments***

8. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection. Specifically, with the arguments concerning the focal positions and imaging the aperture on the sample in view of Mikkelsen (page 10 of Remarks filed November 6, 2003), Kokubo teaches the conjugate relationship of the sample, stop, and two sources in a system for measuring film thickness (see rejections above). As for the declaration filed on November 6, 2003 under 37 CFR 1.131 see Response to Amendments above.

***Fax/Telephone Numbers***

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and

2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

*Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is:* **(703) 872-9306**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (703) 305-4787. The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

gs
January 15, 2004

Zandra V. Smith
Primary Examiner
Art Unit 2877